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# A LONGITUDINAL STUDY OF PERSONALITY AND DISEASE INCIDENCE AMONG ANTARCTIC WINTER-OVER VOLUNTEERS

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## SUMMARY

### Problem

Wintering over in Antarctica is considered to be a stressful experience. However, previous studies have indicated that winter-over personnel have lower rates of disease incidence subsequent to their winter-over assignment than personnel assigned elsewhere. The reasons for the positive effects of wintering over on health remain to be determined.

### Objective

The purpose of this study was to determine whether the personality characteristics of Antarctic winter-over candidates are also related to a long-term risk for disease incidence.

### Approach

Subjects for this study were 2,724 enlisted Navy men who volunteered to winter-over in Antarctica between 1963 and 1974. All of these men were screened and found to be acceptable for winter-over duty. However, only 328 of these men actually wintered over at one of six small stations during this period. The remainder were assigned elsewhere. These two groups were followed using medical and service history records available at the Naval Health Research Center. The mean length of follow-up time for all subjects was 5.4 years. Personality was measured using two inventories, the FIRO-B and an inventory specially designed for evaluating Operation Deep Freeze personnel. Disease incidence was defined as the first hospitalization for each ICDA-8 diagnosis. The Cox proportional hazards model was used to determine the independent contribution of each personality characteristic, age, education, and winter-over experience to disease risk.

### Results

The most significant predictors of long-term disease risk subsequent to being screened for the Operation Deep Freeze Program were age, education, winter-over status, and the personality measures of Control-Expressed and Achievement. Age was positively correlated with increased disease risk while education, Achievement, and Control-Expressed were negatively correlated. Those who did nct winter-over in Antarctica had a significantly higher independent risk for subsequent all-cause first hospitalizations than the winter-over group.

### Conclusion

Individuals with a high need to control and exercise responsibility over others and a high need for achievement appear to be at reduced risk for long-term disease incidence, indicating that an internal locus of control is an important moderator of stress. It is hypothesized that such individuals are better able to acquire and maintain a social support network in times of stress than individuals with an external locus of control. The results also support the hypothesis that the winter-over personnel learn from their experience in the Antarctic and develop coping strategies which reduce the risk of subsequent disease incidence.

### Recommendations

Research is necessary to evaluate the lessons learned from stressful life events and the extent to which these lessons reduce the risk of subsequent illness. Social and psychological characteristics which facilitate the acquisition and utilization of social supports to cope with stressful life events should be identified.

A LONGITUDINAL STUDY OF PERSONALITY AND DISEASE INCIDENCE AMONG ANTARCTIC WINTER-OVER VOLUNTEERS

Although the interrelationships remain complex and little understood, it is by now widely acknowledged that personality is linked in numerous ways to the experience of stressful life events and the risk of illness. There have been a multiplicity of approaches taken to examine the role of personality in the stress-illness relationship. Among the most notable are the risk of coronary heart disease associated with the Type A personality (Friedman & Rosenman, 1974; Jenkins, 1976); the physical and psychological sequellae of certain ego defense mechanisms (Kneier & Temoshok, 1984; Valliant, 1976); the risk of cardiovascular and neoplastic diseases associated with hostility, anxiety and depression (Rabkin, Charles & Kass, 1983; Shekelle, Gale, Ostfield, & Paul, 1983; Siegel 1985) and the efficacy of various coping mechanisms with labels such as control (Folkman, 1984; Rotter, 1966), potency (Ben-Shira, 1985), coherence (Antonovsky, 1979), mastery (Pearlin & Schooler, 1978), personal autonomy (Seeman & Seeman, 1983), and hardiness (Kobasa, 1979) as moderators of stress.

Much of this research has pointed to an interactional view of personality as a determinant of health. Antonovsky's notion of coherence and Kobasa's notion of hardiness, for instance, both emphasize an interactional view of personality, forcing an approach to persons within social contexts (Kobasa & Puccetti, 1983). This interactional view is particularly relevant to the stress-illness relationship since social ties and relationships have long been believed to moderate the effects of stressful life events (Cobb, 1976; Dean & Lin, 1977) and thus promote health and protect people against disease, even death (Cassel, 1976; Berkman & Syme, 1979; House, Robbins and Metzner, 1982). However, as Thoits (1982) observes, virtually all of the literature on social support is characterized by the fact that the relationships between life events, social support, and psychological state have not been explicated. For example, while several studies have examined social support and psychological coping styles together, the personality traits that enable one to acquire and utilize a social support network to cope with a stressful life event remain to be elaborated.

One attempt to integrate the psychological and social moderators of the stress-illness relationship can be found in the model of social environment formulated by Moos (1974) which includes three separate dimensions: relationship dimensions, which assess the involvement of individuals in the environment and the extent to which they support and help one another; personal development dimensions, such as autonomy and responsibility; and system maintenance and system change dimensions such as order, clarity, and control. Social stimuli associated with relationship dimensions of support, cohesion and affiliation generally have positive health effects. Personal development and system change dimensions such as responsibility, work pressure and change, on the other hand, can increase the likelihood of stress and disease. The impact of these dimensions on health and well-being, however, is mediated by the individual's perceptions of the social environment which, in turn, are influenced by personality variables, role and status relationships, and his behavior within the environment (Kiritz & Moos, 1974; Wethington & Kessler, 1986).

One of the major limitations of previous studies of personality and illness has been that, with few exceptions (Howard, Cunningham & Rechnitzer, 1986; Kobasa, Maddi & Kahn, 1982; Seeman & Seeman 1983), they are usually cross-sectional or retrospective in design. Because of this, it is difficult to determine whether the personality characteristic preceded or was influenced by the illness episode. The same problem applies to the examination of the importance of personality as a moderator in the relationship between stressful life events and illness. Experience of an illness can itself lead to feelings of powerlessness, loss of control, and symptoms of neuroticism, anxiety or depression. It is also difficult to determine whether these feelings result from the experience of a particular life event. If so, then personality traits do not become moderators of the stress-illness relationship but are themselves outcomes of stress.

A large number of these studies also rely on self-reported measures of stress and illness rather than objective indices such as a uniform life event--i.e., death of spouse, unemployment--and clinical diagnoses or hospital admissions. As Schroeder and Costa (1984) noted, there are certain problems inherent in using retrospective self-reports of life events because conventional life event measures include events related to physical health which overlap the criterion; events related to neuroticism, which influences the criterion; and events that are vague and subjective and could be affected by individual differences in psychological distress, response sets, and retrospective bias.

Personality characteristics are important in selecting personnel to winter-over in Antarctica. Because evacuation of scientific and support personnel from the Antarctic is all but impossible during the austral winter, the purpose of this screening is to insure maximum performance and minimize the risk of psychiatric and other health-related problems among winter-over personnel. Screening has been undertaken since 1957 using the combined clinical evaluations of teams of Navy psychiatrists and clinical psychologists. In addition, personality inventories have been utilized to aid in this task as well as to develop predictive indicators of subsequent health and performance "on the ice" (Gunderson 1974).

With an environment characterized by extreme temperatures, high altitudes, low humidity, high winds, and extreme light-dark cycles, Antarctica is barely capable of supporting resident plant and animal life, much less human communities. Yet, it is the social rather than the physical environment, the product of prolonged isolation, which is the most important source of stress for winter-over personnel (Palinkas, 1985). This environment is distinguished by difficulty in communicating with family or friends or dealing with real or imagined unpleasant events at home; feelings of rejection resulting from delays in arrival of relief parties, shortages in supplies, or interference of outside authorities with established routines and expectations; the lack of privacy in cramped quarters; boredom due to the lack of environmental stimulation and interaction with the same limited number of individuals; sexual deprivation; and the absence of statuses and roles which define one's position in the outside world (Natani & Shurley, 1974). The stressful nature of this environment has been well documented (Gunderson, 1963; Mullin, 1960; Palmai 1963). All winter-over personnel are believed to manifest this stress in varying degrees while on the ice in a cluster of symptoms commonly referred to as the "winter-over syndrome." These symptoms include depression, problems of hostility, sleep disturbance, and impaired cognition (Palinkas, 1985; Strange & Klein, 1974).

Despite the stressful nature of this environment, an earlier longitudinal study (Palinkas, 1986) found that the rates of all-cause first hospitalizations among enlisted Navy personnel who wintered over between 1963 and 1974 were significantly lower subsequent to Antarctic duty than the rates among a control group of enlisted men who were screened and found acceptable for winter-over duty but who were assigned elsewhere. Those who experienced the stressful environment, therefore, had significantly fewer subsequent disease events than personnel who did not winter-over. Because the two groups were similar with respect to their clinical evaluations, the difference cannot be attributed to the screening process. However, it is possible that the differences in rates of disease incidence were due to differences in personality characteristics which moderate the effect of social environment upon health and well-being. Thus, two questions emerged from this earlier research: (1) from an interactional perspective, do the winter-over and control groups exhibit different personality traits; and (2) do these traits predict for long-term disease incidence as defined by a first hospitalization for a specific disease? This study represents an exploratory effort with the objective of determining whether the personality characteristics of Antarctic winter-over personnel moderate the relationship between a prolonged stressful life event (the winter-over experience) and a subsequent long-term risk for disease incidence.

## METHODS

### 1. Subject Population

Subjects for this study were 2,724 enlisted Navy men who volunteered to winter-over in Antarctica between 1963 and 1974. All of these individuals were evaluated by screening teams, each consisting of a clinical psychologist and psychiatrist, and found to be acceptable for winter-over duty. As in the earlier study (Palinkas, 1986), the study population was divided into two groups on the basis of whether or not they actually wintered over at one of six small stations between 1963 and 1974. Because of the specific needs of personnel with certain qualifications at each station, only 328 of these individuals actually wintered over during the 1963-1974 period. The remainder either spent the austral summer in Antarctica or were assigned elsewhere.

Records of screening evaluations of the study subjects were compiled into a computerized file at the Naval Health Research Center. The Operation Deep Freeze File contains biographical and service history information and screening results on 4,557 military and civilian applicants from this period. However, only Navy enlisted personnel were selected for follow-up because of the availability of medical and service history data on these individuals. The Naval Health Research Center maintains an Inpatient Medical Data File which contains records on all hospitalizations for all active duty Navy personnel for the period 1965-1984. Data files obtained from the Manpower and Personnel Management Information System (NMPC 15642) contain service history information on all enlisted personnel during this period as well. These two files were searched for all medical and service history information on the Navy enlisted personnel identified from the Operation Deep Freeze File.

A 14.5 year period from 1965 to 1979 was established for follow-up. This was based on the period of time for which medical and service history information was available for both groups at the time the study was conducted. The start date for participation in the study was established as 1 July 1965 or the year an individual was evaluated for the Operation Deep Freeze Program if

after this date. Withdrawal was defined as the date of last discharge from the Navy or 31 December 1979, whichever came first.

2. Assessment of Stress

As noted above, winter-over personnel in general display individual differences with respect to the winter-over syndrome. Nevertheless, they all experience a common stressful life event characterized by prolonged isolation in a harsh environment. Despite wide differences in duty station and assignment, members of the control group were not subject to this particular experience. The common experience of a stressful life event by the winter-over personnel, enabled us to avoid methodological difficulties arising from the use of several different types of life events (i.e. positive vs negative events) (Dohrenwend, 1973; Johnson & Sarason, 1978). The two groups, therefore, enabled us to determine the long-term effect of a uniform life event (i.e., prolonged exposure to a stressful environment) on subsequent risk for serious illness.

3. Psychological Measures

The personality characteristics and interpersonal needs of study subjects were measured by two scales which were originally employed to screen prospective candidates for winter-over duty during this period and to predict for performance on the ice. The first inventory was the FIRO-B (Schutz, 1958). This questionnaire was designed to assess how an individual acts in three areas of social interaction in terms of the behavior the individual expresses towards others (expressing) and how he wants others to behave towards him (wanting). The six scales may be characterized as follows: Inclusion-Expressed (participating in group activities); Inclusion-Wanted (desiring to be included in group activities); Control-Expressed (controlling others, expressing dominance and leadership); Control-Wanted (wanting direction or regulation from others); Affection-Expressed (being affectionate with others); and Affection-Wanted (wanting affection from others). A score on each subsection of the FIRO-B can range from 0 to 9. Across various adult groups sampled, the FIRO-B items have shown an average internal consistency (coefficient $\alpha$ ) of .94. As to stability, Schutz (1967) reported a mean coefficient of the six scales of .76.

The remaining test scales and rating measures utilized in the study were developed especially for the Antarctic screening program on the basis of qualities believed to be desirable in winter-over personnel (Gunderson & Ford, 1962). Factor analysis was employed to identify highly intercorrelated clusters of inventory items which appeared to represent meaningful psychological concepts (Gunderson & Mahan, 1966). Four of the test scales measured common psychological needs: Achievement, Autonomy, Nurturance, and Order. The content of these four scales are generally similar to those of the corresponding Edwards Personal Preference Schedule (EPPS) scales (Edwards, 1959), although the format of the items was entirely different. In order to avoid problems with the ipsative nature of the EPPS scales, the need scales were presented as single items to be evaluated on six-point scales ("strongly agree" to "strongly disagree"), and response values were summed from highly intercorrelated items. Unlike the EPPS measures, a high score on the Antarctic scales indicated a low need for a particular trait. In this study, however, the scales were reversed to conform with the FIRO-B measures so that a high score on all ten scales reflected a high need.

In this study, each of the ten scales were examined independently. In order to determine the effect of these personality characteristics on risk for first hospitalization, the subjects were

divided into two groups for each personality measure on the basis of whether their scores fell above or below the median.

4. Measure of Disease Incidence

Disease incidence was defined on the basis of the first inpatient admission for all diagnoses for each subject. Inpatient medical data included all first hospitalizations for all diagnoses which occurred after entry into the study (i.e., subsequent to screening for Operation Deep Freeze). Diagnoses were in accordance with the Eighth Revision, International Classification of Disease Adapted for Use in the United States (ICDA-8). In the earlier study (Palinkas, 1986), first hospitalization rates for 16 ICDA-8 diagnostic categories were calculated using person-years at risk as the denominator. Because only men were included in the study, two diagnostic categories--complications of pregnancy, childbirth and the puerperium and certain causes of perinatal morbidity and mortality--were not included in the analysis. Rates were age-adjusted using the direct method of adjustment (Lilienfeld & Lilienfeld, 1980). The standard population was comprised of all study subjects. In this study, the Cox proportional hazards model (Lee, 1980) was used to determine the independent effect of each personality dimension after adjusting for differences in age, education, and winter-over status.

## RESULTS

1. Description of Sample

The subjects were young ($\bar{X}$ = 26.1) enlisted men with a mean paygrade ($\bar{X}$ = 4.9) reflecting that of 2nd class petty officers and an average of seven ($\bar{X}$ = 7.0) years of service in the Navy at the time they were screened for the Operation Deep Freeze Program. Most (71.0%) of the subjects were high school graduates and 15% had one or more years of college. Slightly over half (50.5%) of the subjects were blue collar personnel; the remainder were classified in administrative-clerical (23.4%), electronic-technical (15.2%), medical (6.7%), and apprentice (3.8%) occupational categories. Average follow-up time for the entire population was 5.4 years. The winter-over group was slightly older ($\bar{X}$ = 27.1) than the control group ($\bar{X}$ = 26.0). Twenty-nine percent of the control group had less than a high school education in comparison with 34.6 percent of the winter-over personnel. No significant differences between the two groups were observed with respect to race or occupation (white vs nonwhite, blue collar vs all other).

2. Intercorrelations of Personality and Demographic Measures

The intercorrelations of the Antarctic and FIRO-B measures and demographic characteristics of age and education are presented in Table 1. Because of the large number of subjects, almost all of the correlations displayed statistical significance ($p < .001$). However, only fifteen of these correlations were greater than .20. The highest correlations were observed between Expressed and Wanted Inclusion ($r = .54$) and Expressed and Wanted Affection ($r = .57$). Inclusion (both Expressed and Wanted) also showed modest correlations with both measures of Affection. A modest correlation ($r = .36$) also was observed between Achievement and Order. With the exception of a .22 correlation between age and Autonomy, the correlations between the personality scales, age and education were either of a small order or statistically insignificant. Age and education were inversely related (-.27).

Table 1. Intercorrelations of EPPS and FIRO-B Measures of Personality Needs of Enlisted Navy Personnel, Operation Deep Freeze Volunteers, 1963-1974

| | Mean | S.D. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Achievement | 15.36 | 4.32 | 1.00 | -.10 | .18 | .36 | .15 | .12 | .17 | -.08 | .15 | .11 | .07 | .01 |
| 2. Autonomy | 31.54 | 5.61 | | 1.00 | .04 | -.16 | -.13 | -.06 | .17 | .05 | -.11 | -.11 | -.22 | .14 |
| 3. Nurturance | 20.17 | 4.22 | | | 1.00 | .17 | .27 | .27 | .15 | .12 | .26 | .27 | -.01 | .01 |
| 4. Order | 14.69 | 4.16 | | | | 1.00 | .15 | .05 | .03 | -.09 | .09 | .07 | .10 | -.02 |
| 5. Inclusion (E) | 4.67 | 2.13 | | | | | 1.00 | .54 | .17 | .21 | .42 | .31 | -.09 | .11 |
| 6. Inclusion (W) | 3.41 | 3.42 | | | | | | 1.00 | .15 | .12 | .41 | .46 | -.11 | .05 |
| 7. Control (E) | 2.64 | 2.14 | | | | | | | 1.00 | .21 | .12 | .04 | .10 | .10 |
| 8. Control (W) | 4.77 | 1.94 | | | | | | | | 1.00 | .11 | .03 | -.07 | .07 |
| 9. Affection (E) | 3.18 | 2.01 | | | | | | | | | 1.00 | .57 | .02 | .07 |
| 10. Affection (E) | 3.65 | 2.41 | | | | | | | | | | 1.00 | .06 | .02 |
| 11. Age | 26.12 | 5.95 | | | | | | | | | | | 1.00 | -.27 |
| 12. Education* | 5.51 | 1.33 | | | | | | | | | | | | |

*Education was scored from 1 (7 years or less) to 9 (17 years or more). High school graduates were scored as 6.

The next step was to examine the differences in the personality profiles of the winter-over and control groups. T-tests were used to compare the mean scores of each scale for the two groups. The results are presented in Table 2. None of the differences in mean personality scores between the two groups were statistically significant.

Table 2. Personality Scores of Winter-Over and Control Groups, Operation Deep Freeze Volunteers, 1963-1974

| | Winter-Over | | Control | | F value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Achievement | 15.01 | 4.38 | 15.43 | 4.30 | 1.04 |
| Autonomy | 32.46 | 5.30 | 31.45 | 5.59 | 1.11 |
| Nurturance | 19.94 | 3.99 | 20.21 | 4.23 | 1.12 |
| Order | 14.35 | 3.97 | 14.68 | 4.17 | 1.10 |
| Inclusion-Expressed | 4.75 | 2.13 | 4.63 | 2.12 | 1.01 |
| Inclusion-Wanted | 3.34 | 3.46 | 3.37 | 3.40 | 1.04 |
| Control-Expressed | 2.62 | 2.17 | 2.65 | 2.12 | 1.04 |
| Control-Wanted | 4.79 | 1.90 | 4.78 | 1.93 | 1.03 |
| Affection-Expressed | 3.26 | 1.86 | 3.16 | 2.02 | 1.18 |
| Affection-Wanted | 3.76 | 2.31 | 3.63 | 2.42 | 1.10 |

3. Rates of First Hospitalization and Risk of Disease Incidence

The number and age-adjusted rates of first hospitalization observed during the follow-up period among the study subjects by diagnostic category and winter-over status, as reported in the earlier study (Palinkas, 1986) is provided in Table 3. Accidents, poisonings and violence and

diseases of the digestive and circulatory systems comprised the largest percentages of first hospitalizations for both groups. The winter-over group had significantly lower rates of total all-cause first hospitalizations; neoplasms; endocrine, nutritional and metabolic diseases; and diseases of the musculoskeletal system than the control group. Differences observed in the remaining diagnostic categories failed to reach statistical significance.

Table 3. Age-Adjusted First Hospitalization Rates (per 10,000 person years), Relative Risk Estimates and 95% Confidence Intervals by Winter-Over Status and Diagnostic Category, Operation Deep Freeze Volunteers, 1965-1979

| Diagnostic Category | Winter-Over | | Controls | | Relative | 95% C.I. |
|---|---|---|---|---|---|---|
| | N | Rate | N | Rate | Risk | |
| Infective and Parasitic Diseases | 9 | 45.01 | 48 | 37.39 | 1.20 | 0.35 - 2.05 |
| Neoplasms | 2 | 9.53 | 45 | 35.38 | 0.27 | -0.11 - 0.65* |
| Endocrine, Nutritional and Metabolic Diseases | 3 | 14.07 | 44 | 34.55 | 0.41 | -0.07 - 0.89* |
| Diseases of Blood and Blood-Forming Organs | 3 | 14.13 | 8 | 6.29 | 2.25 | -0.74 - 5.24 |
| Mental Disorders | 10 | 47.02 | 94 | 73.84 | 0.64 | 0.22 - 1.06 |
| Diseases of the Nervous System and Sense Organs | 7 | 32.89 | 59 | 46.17 | 0.71 | 0.15 - 1.27 |
| Diseases of the Circulatory System | 17 | 81.97 | 114 | 89.54 | 0.92 | 0.45 - 1.39 |
| Diseases of the Respiratory System | 14 | 65.26 | 75 | 58.80 | 1.11 | 0.48 - 1.74 |
| Diseases of the Digestive System | 24 | 114.91 | 155 | 121.71 | 0.94 | 0.54 - 1.34 |
| Diseases of the Genitourinary System | 7 | 33.23 | 60 | 46.96 | 0.71 | 0.15 - 1.27 |
| Diseases of the Skin and Subcutaneous Tissue | 7 | 33.06 | 46 | 36.04 | 0.92 | 0.19 - 1.65 |
| Diseases of the Musculo-skeletal System | 10 | 46.63 | 106 | 83.22 | 0.56 | 0.20 - 0.92* |
| Congenital Anomalies | 4 | 18.83 | 15 | 11.79 | 1.60 | -0.16 - 3.36 |
| Symptoms and Ill-Defined Conditions | 7 | 33.02 | 66 | 51.73 | 0.66 | 0.15 - 1.17 |
| Accidents, Poisonings, and Violence | 25 | 117.99 | 207 | 161.19 | 0.73 | 0.43 - 1.03 |
| Supplementary Classifications | 7 | 32.74 | 50 | 39.17 | 0.84 | 0.18 - 1.50 |
| Total First Hospitalizations | 156 | 740.32 | 1190 | 932.25 | 0.79 | 0.66 - 0.92* |
| Person Years at Risk | 2001 | | 12828 | | | |

*$p < .05$

Because the number of first hospitalizations in each diagnostic category were too small to yield meaningful results, the Cox proportional hazards model was used to assess the joint effects of demographic and personality characteristics on risk of all-cause first hospitalizations. As shown in Table 4, when all demographic and personality factors are combined in one model, age and education were significant predictors with personnel 26 years and older exhibiting the highest relative risk. Winter-over experience was also a significant predictor of subsequent disease incidence; those who wintered over exhibited a 20 percent decreased risk ($p. < .01$). After

controlling for the demographic characteristics and winter-over experience, only Control-Expressed ($p. < .01$) and Achievement ($p. < .05$) were significant independent predictors of first hospitalization.

Table 4. Coefficients, Relative Risk Estimates, and 95% Confidence Intervals for All-Cause First Hospitalizations among Operation Deep Freeze Volunteers, 1965-1979 (based on Cox's proportional hazards model).

| Variable | Coefficient | Standard Error | Relative Risk | 95% C.I. |
|---|---|---|---|---|
| Age (26+/17-25) | 0.3826 | 0.061 | 1.47 | 1.30-1.65*** |
| Education (<12/HS Grad) | -0.1481 | 0.059 | 0.86 | 0.77-0.97** |
| Winter Over (W.O./Control) | -0.2256 | 0.090 | 0.80 | 0.62-0.97** |
| Achievement (Hi/Low) | -0.1249 | 0.060 | 0.88 | 0.77-0.99* |
| Autonomy (Hi/Low) | -0.0335 | 0.059 | 0.97 | 0.85-1.08 |
| Nurturance (Hi/Low) | -0.0027 | 0.060 | 1.00 | 0.88-1.11 |
| Order (Hi/Low) | -0.0116 | 0.059 | 0.99 | 0.87-1.10 |
| Inclusion-Expressed (Hi/Low) | 0.0611 | 0.071 | 1.06 | 0.92-1.22 |
| Inclusion-Wanted (Hi/Low) | -0.0668 | 0.069 | 0.93 | 0.82-1.07 |
| Control-Expressed (Hi/Low) | -0.1738 | 0.062 | 0.84 | 0.74-0.95** |
| Control-Wanted (Hi/Low) | 0.0324 | 0.067 | 1.03 | 0.91-1.18 |
| Affection-Expressed (Hi/Low) | 0.0327 | 0.073 | 1.03 | 0.90-1.19 |
| Affection-Wanted (Hi/Low) | 0.0282 | 0.063 | 1.03 | 0.91-1.16 |

* $p. < .05$

** $p. < .01$

*** $p. < .001$

## DISCUSSION

As the results indicate, the most significant predictors of long-term disease risk subsequent to Antarctic screening were age, education, winter-over status, and the personality measures of Control-Expressed and Achievement. Age was positively correlated with increased disease risk while education, Achievement and Control-Expressed were negatively correlated. Our results also indicated that those who wintered over in Antarctica had a significantly decreased risk for subsequent all-cause first hospitalizations than the control group. This difference cannot be attributed to differences in personality, age or education. How, then, do we explain this positive effect of a prolonged stressful experience?

Other studies (Palinkas, 1985; Taylor, 1974) have suggested that winter-over personnel learn from their experience in Antarctica, becoming more independent and self-reliant. The fact that the winter-over personnel have significantly fewer first hospitalizations throughout their enlisted careers when contrasted with the control group suggests that the lessons learned in coping with the stressful Antarctic environment may be utilized in coping with other stressful experiences as well. If, in fact, this is the case, then stressful life events may not always result in illness because individuals with certain personality characteristics in certain social and environmental contexts may learn from their experience and develop coping styles and social re-

sources enabling them to cope with subsequent events, thereby reducing the risk for illness in the long-term. This may help to explain the low order correlations found in most studies.

It is not suprising that both the winter-over experience and a high need for expressed control were significant predictors of improved health status. The winter-over experience addresses the issue of the limits of one's control over his or her physical and social environment. All winter-over personnel must learn to cope with limited control over their environment. They are dependent upon their physical shelters to withstand the harsh climate and must interact with the same group of people for eight months at a time. Removal from this environment during this period is not possible. Not all personnel are equally deprived of control, however. Scientists, by virtue of their research, are often able to work in an independent and autonomous manner. Navy enlisted personnel, on the other hand, are subject to military rules and regulations while on the ice, must obey the orders of superior officers, and are perceived and perceive themselves as subordinate to the scientists by virtue of their role as "support personnel." Earlier research has demonstrated that it is the enlisted personnel who experience the most severe symptoms of the winter-over syndrome (Doll & Gunderson, 1971).

Moreover, a sense of control over the environment has been implicated as a moderator of stress in several different studies. A study of men who had experienced ischemic strokes (Adler, MacRitchie & Engel, 1971), for instance, found that the stroke typically occurred in a general situation in which the individual felt he was no longer in control of his environment. Studies which have applied Rotter's (1966) notion of locus of control have generally found that individuals with an external locus of control are at greater risk for physical and psychological disorders than individuals with an internal locus of control (Johnson & Sarason, 1978; Seligman, 1975). Evidence produced by Seeman and Seeman (1983), for example, showed that the sense of control is associated with: (1) practicing preventive health measures, e.g. diet, exercise, alcohol moderation; (2) making an effort to avoid the harm in smoking (by quitting, trying to quit, or simply not smoking); (3) being more sanguine about early medical treatment for cancer; (4) achieving higher self-ratings on general health status; and (5) reporting fewer episodes of both chronic and acute illness. The concept of mastery used by Pearlin and Schooler (1978) also includes notions of control, as does the concept of potency used by Ben-Shira (1984) and Kobasa's concept of hardiness.

However, in almost all of these cases, control is viewed in the context of discrete events and not social interaction. The Control-Expressed measure of the FIRO-B refers to the need to establish and maintain a satisfactory relationship with people with respect to control and power. A high score on this measure indicates a need to control and influence, to exercise leadership and responsibility over others. Rather than serving as a measure of control over events, the Control-Expressed measure may indicate the need for control over social networks that may serve as sources of support in times of stress. Other studies (c.f. Burger, 1985; Lefcourt, Martin & Saleh, 1984; Sandler & Lakey, 1982) have indicated that persons with an internal locus of control exhibit a need to control others, and that such individuals derive greater benefits from social support when confronted with stressful life events than persons with a more external orientation. Similarly, the desire to control others has been found to be positively related to achievement need (Burger, 1985). While the correlation between the two measures in our study was modest ($r = .17$), the

association between the two personality needs might account for the observed inverse correlation between disease and achievement need. Thus, individuals who score high on the need to control others, measured by the Control-Expressed and Achievement scales, may be better able to develop and utilize social support networks in times of stress to reduce the risk of illness than individuals with a low need to control others.

While this conclusion remains to be investigated by more rigorous methods than the ones available in this study, it does point to an important distinction between the availability of social networks to provide support in times of stress and the utilization of this resource. One may have several relatives and friends upon whom to rely in the event of a stressful experience. However, the ability to direct that network to provide the necessary support--whether emotional, instrumental, or both--may depend upon the personality traits of the person undergoing the stressful experience.

One of the major limitations of this study was the use of the selected personality inventories. As noted earlier, this study represented an exploratory effort using scales which were administered several years ago for the purposes of screening winter-over applicants and predicting performance in Antarctica. The FIRO-B was found to be a good predictor of adjustment on the ice among scientists but not among Navy personnel (Gunderson, 1974). Similarly, studies which have used the FIRO-B to predict psychological distress have produced mixed results. Saxon and his colleagues (1978) reported that heroin users undergoing treatment scored low on all six FIRO-B scales. However, a study by Gard and Bendig (1964) found the inventory to be of little use in differentiating groups of psychiatric patients.

Because measures of the social environment of study subjects subsequent to screening for Operation Deep Freeze were unavailable, we were also not able to control for the degree of person-environment fit. As Mischel (1968) asserts, personality traits generally predict specific behavioral outcomes only at low levels of efficiency; situational factors, on the other hand, are more influential in predicting criterion behaviors. A more precise assessment of the role of personality in moderating the effects of the winter-over experience would require either an ideographic approach to personality (Bem & Allen, 1974), the measurement of social climate (Kiritz & Moos, 1974), or some other means of controlling the situation in which personality traits are measured.

Likewise, we were unable to control for a potential confounding relationship between duty station environment and disease risk among the subjects in the control group. However, because members of this group were assigned to duty stations throughout the world and thus exposed to a wide variety of environmental conditions, such control was not possible. Moreover, when compared with the relatively uniform stressful life experience of the winter-over personnel, such control was deemed to be unnecessary.

Finally, it is possible that the results obtained in this study reflect the personality traits of a highly select group of individuals and thus cannot be generalized. However, the screening process is more noteworthy for screening out winter-over candidates with obvious physical or psychological limitations than for selecting individuals capable of adapting well to the Antarctic winter or any other stressful experience. In addition, by selecting a healthy group

of subjects at baseline, we were able to control for the potential confounding effect of pre-life event health status on subsequent disease incidence.

Despite these limitations, two specific areas for additional research are indicated by the results of this study. First, research is necessary to evaluate the lessons learned from stressful life events and the extent to which these lessons reduce the risk of subsequent illness. Second, the social and psychological characteristics which facilitate the acquisition and utilization of social supports to cope with stressful life events should be identified. A similar suggestion was made by Wallston and her colleagues (1983) in their review of the literature on social support and physical health. A better understanding of these characteristics should help to clarify the role of both personality and social support as moderators in the life event stress-illness relationship.

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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

This study examined the relationship between certain personality characteristics and the long term risk for disease incidence. Subjects were 2,724 enlisted Navy men who volunteered to winter-over in Antarctica between 1963 and 1974. Men who actually wintered-over were compared with a control group of personnel found to be acceptable for winter-over duty but assigned elsewhere. Both groups were followed using medical and service history records to determine rates of all-cause first hospitalizations. Personality was measured using the FIRO-B scales and an inventory specially designed for evaluating winter-over personnel. The Cox proportional hazards model was used to determine the contribution of each personality characteristic, age, education, and winter-over experience to disease risk. Results indicated that age was positively correlated with increased disease risk while education and the personality measurres of Control-Expressed and Achievement need were negatively correlated. Those who did not winter-over in Antarctica had a significantly higher independent risk for subsequent disease incidence than the winter-over group.

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